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CLASSIFICATION OF CARTOGRAPHIC FEATURES THROUGH WALSH TRANSFORM--ETC(U)
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Classification of cartographic features through Walsh transforms

Pi-Fuay Chen

Frederick W. Rohde

William W. Seemuller

APRIL 1982

U.S. ARMY CORPS OF ENGINEERS
ENGINEER TOPOGRAPHIC LABORATORIES
FORT BELVOIR, VIRGINIA 22060

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER ETL-0290	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) CLASSIFICATION OF CARTOGRAPHIC FEATURES THROUGH WALSH TRANSFORMS		5. TYPE OF REPORT & PERIOD COVERED Research Note 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Pi-Fuay Chen Frederick W. Rohde William W. Seemuller		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 6.11.02.A 4A161102B52CB0012
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer Topographic Laboratories Fort Belvoir, VA 22060		12. REPORT DATE April 1982 13. NUMBER OF PAGES 39
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Cartographic Feature Extraction and Recognition
Orthoginal Functions
Solid-State Sensor Arrays
Walsh Transforms

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

An Algorithm was used to classify and recognize a set of selected cartographic features, such as road intersections, straight-line roads, and rectangular objects, which were decomposed in the Walsh transform domain. The method was implemented digitally with an experimental system consisting of a solid state sensor array, a minicomputer as signal processor, and a computer-controlled translational stage as the image holder. Recognition examples for the set of cartographic features with respect to the window of inspection are presented. Nearly 90 percent recognition accuracy was obtained for the selected set of the cartographic features.

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PREFACE

This work reported on was done under DA Project, 4A161102B52C, Task B, Work Unit 0012, "Electronic Image Analysis for Feature Extraction."

The work was performed during the period September 1979 to December 1980 under the supervision of Mr. M. Crowell, Jr., Director, Research Institute. The authors of this report have been listed in alphabetical order.

COL Edward K. Wintz, CE was Commander and Director and Mr. Robert P. Macchia was Technical Director of the Engineer Topographic Laboratories during the study and report preparation.

CONTENTS

ILLUSTRATIONS

CLASSIFICATION OF CARTOGRAPHIC FEATURES THROUGH WALSH TRANSFORMS

INTRODUCTION

In 1980, a technique was developed by the U.S. Army Engineer Topographic Laboratories (ETL) for extracting a selected set of cartographic features such as road intersections, straight-line roads, and rectangular objects using the Walsh transform. The technique was implemented separately in two ways. First, a 32- x 32-element, solid-state sensor array was used to convert optical energy of aerial imagery into an electronic signal that was processed in a minicomputer to yield Walsh transforms.[1] Second, a prototype image spectrum analyzer (PISA) was developed that uses a large plasma discharge device (8.5 x 8.5 inches lighting area with 512 electrodes each in both x and y directions) to generate two-dimensional Walsh function patterns and produce 512 x 512 Walsh transforms in 14 seconds.[2]

The PISA produced successful results for a selected set of targets representing manmade cartographic features as stated above. Since the sensor array system provides a variable threshold function, the results were even better. The cartographic features as described with background scenes and noise were extracted easily from several aerial imageries.[3] In the above referenced reports, only the extraction of manmade cartographic features and the extablishment of signal signatures for each feature are described.

In this report, an algorithm was used to classify and recognize a set of selected cartographic features that were decomposed in the Walsh transform domain. The method was implemented digitally with an experimental system consisting of a solid-state sensor array, a minicomputer as signal processor, and a computer-controlled translational state as the image holder. Recognition examples for the set of cartographic features with respect to the window of inspection are presented. Finally, conclusions are given.

---

[1] P.F. Chen and W.W. Seemuller, *Signal Signatures of Topographic Features Using Analog Technology*, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia, ETL-0185, May 1979. AD-A076 110.

[2] P.F. Chen, F.W. Rohde, and W.W. Seemuller, *Prototype Image Spectrum Analyzer (PISA) for Cartographic Feature Extraction*, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia, ETL-0204, October 1979, AD-A080 729.

[3] Ibid.

IMPLEMENTATION

Digital Minicomputer as a Feature Detector ● An experimental system was developed that will produce signal signatures (Walsh Transforms) from the gray shade distribution of photo transparencies and that is based on the uniqueness of the signal signatures to detect and recognize the type of cartographic features in a reasonable short time. The block diagram of the system is shown in figure 1.

A 9- by 9- inch aerial photo transparency is illuminated by a white light source, and a section of the transparency is imaged onto a Reticon 32- x 32-element area sensor array. The transparency is held by a computer-controlled, two-dimensional, translational stage so that the image can be arbitrarily positioned against the surface of the array in both x and y directions. The array converts the optical energy of the image into a video signal. The video signal is digitized and then sliced in a Hewlett-Packard, 2108 minicomputer to become a two-valued binary signal. Because the value of the threshold is adjustable, a very convenient means is provided for isolating signals representing the selected feature image from the unwanted background noise. The "on" value of the video is arbitrary set to "100" and "off" to "0" and printed by a line printer as a two-dimensional binary array of 32 x 32 pixels, which represent the spatial signal signatures of the selected topographic features. The sliced signal is masked with pregenerated, two-dimensional Walsh functions having only two values, either +1 or −1, to produce the Walsh transform for that given input image or signal. This process of obtaining two-dimensional discrete Walsh transform can be expressed as

$$A(i, j) = \frac{1}{1024} \sum_{x=1}^{32} \sum_{y=1}^{32} f(x, y)\mathrm{Wal}(i, x)\mathrm{Wal}(j, y)$$

where f(x, y) is the image binary array; Wal(i, x)Wal(j, y) is the two-dimensional Walsh function of order i and j; and x, y, i, and j take values from 1 to 32.[4]

[4]H.F. Harmuth, *Sequency Theory, Foundation and Application*, New York, Academic Press, Inc., 1977, pp. 55–56.

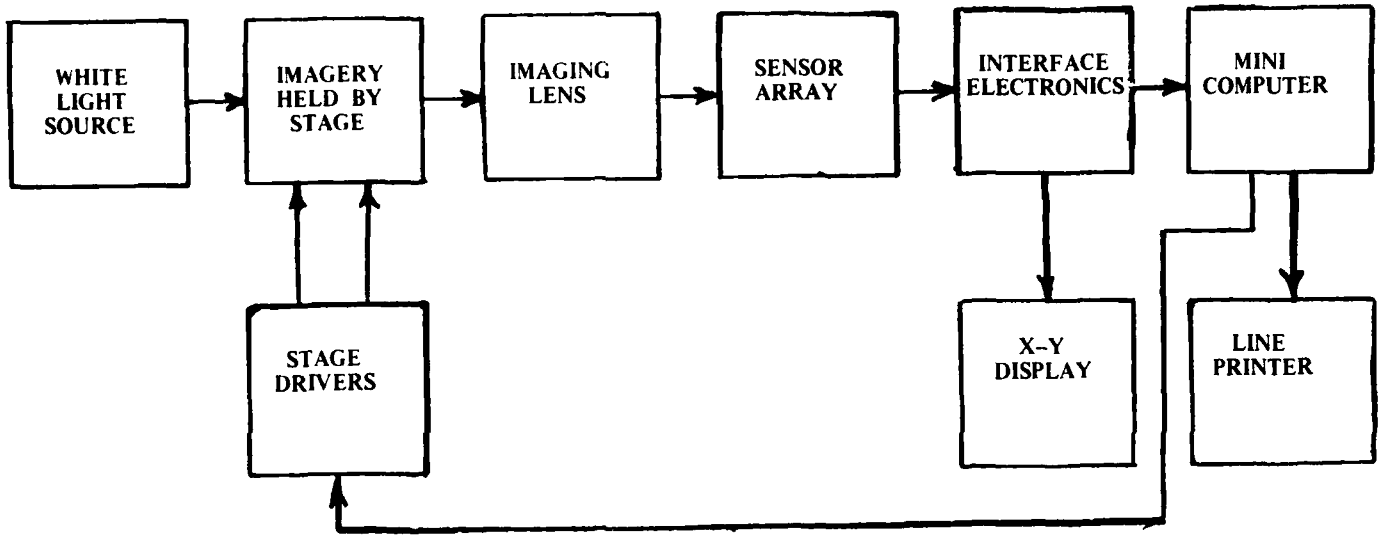

FIGURE 1. System Block Diagram.

The Walsh transform coefficients, also called decomposed signal signatures, were divided by a convenient constant; for this case, 1,024, which is the number of pixels in a frame for normalization. The entire normalized set of the Walsh transform coefficients was printed by the line printer.[5]

The detecting scheme was implemented based on the uniqueness of the Walsh transform of each feature under consideration. At first, a reference signal signature was established for each cartographic feature of the entire selected set. The test imagery, after being transformed into the Walsh domain, was then compared to each reference signal signature sequentially, and classification was made. Because cartographic features may appear in a variety of locations in the window of inspection (for this case the active surface of the sensor array) and because Walsh transforms are neither translationally nor rotationally invariant, two or more reference signal signatures are required for each class of cartographic feature to avoid misclassification. With this modification, four out of seven cartographic features selected were recognized without error, regardless of their location with respect to the window. The rest of the features were also classified correctly in a majority of the locations. However, misclassification occurred when these three features were located very close to the corners of the window. The flow chart for this detection scheme is shown in figure 2. Both the magnitude of a single Walsh transform coefficient (or sum of a row, or a column of transform coefficients) and the ratio of each significant coefficient to A(1, 1) or A(2, 1) or A(3, 1) were used as reference signal signatures for classification. At the end of each classification, the translational stage was automatically moved a predetermined number of steps in the x and y direction, and the new segment of the test image was projected onto the surface of the array. The same procedures described above were repeated.

[5]P.F. Chen and W.W. Seemuller. *Signal Signatures of Topographic Features Using Analog Technology*. U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia, FTL-0185, May 1979, AD-A076 110.

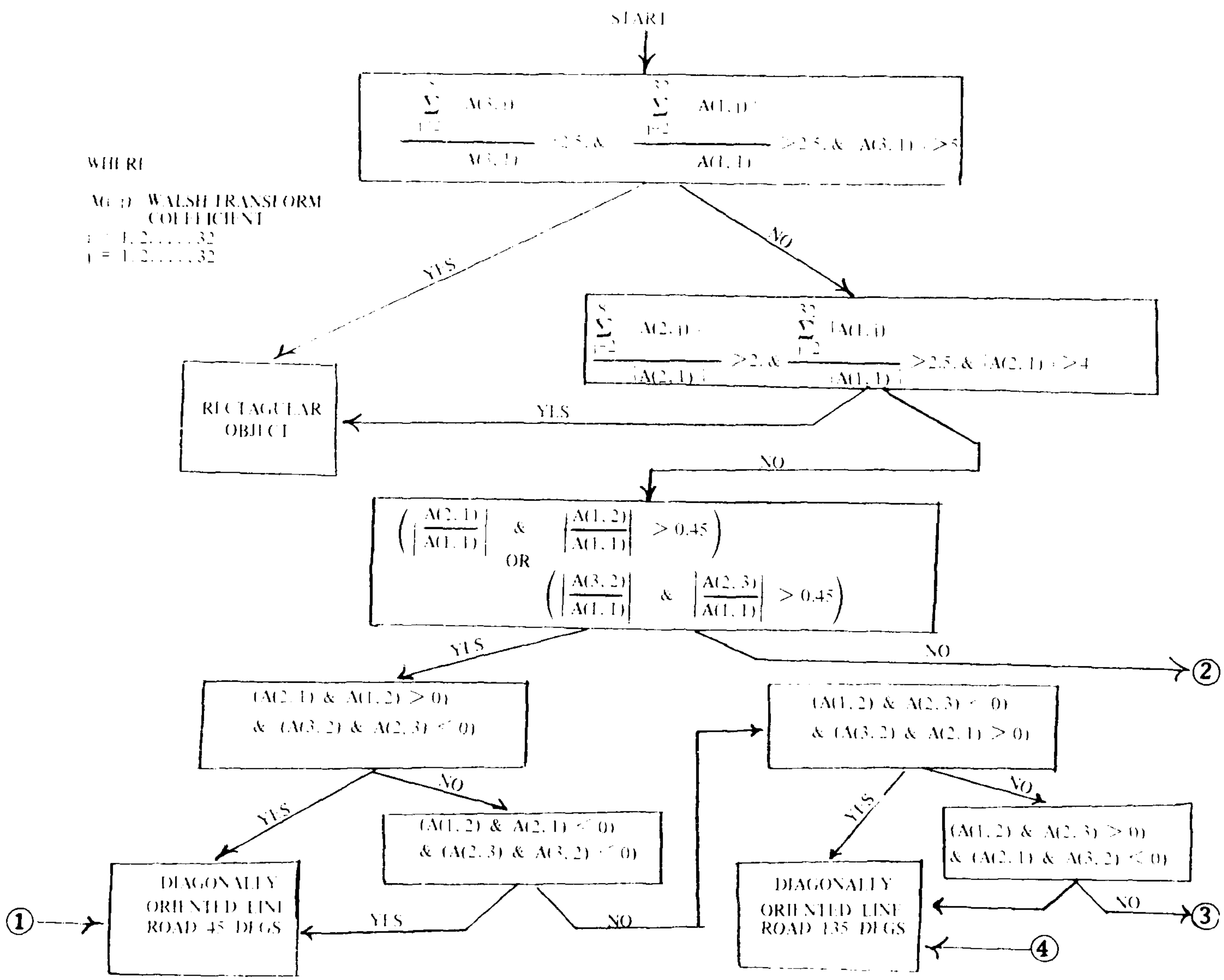

FIGURE 2. Flow Chart of Classifier.

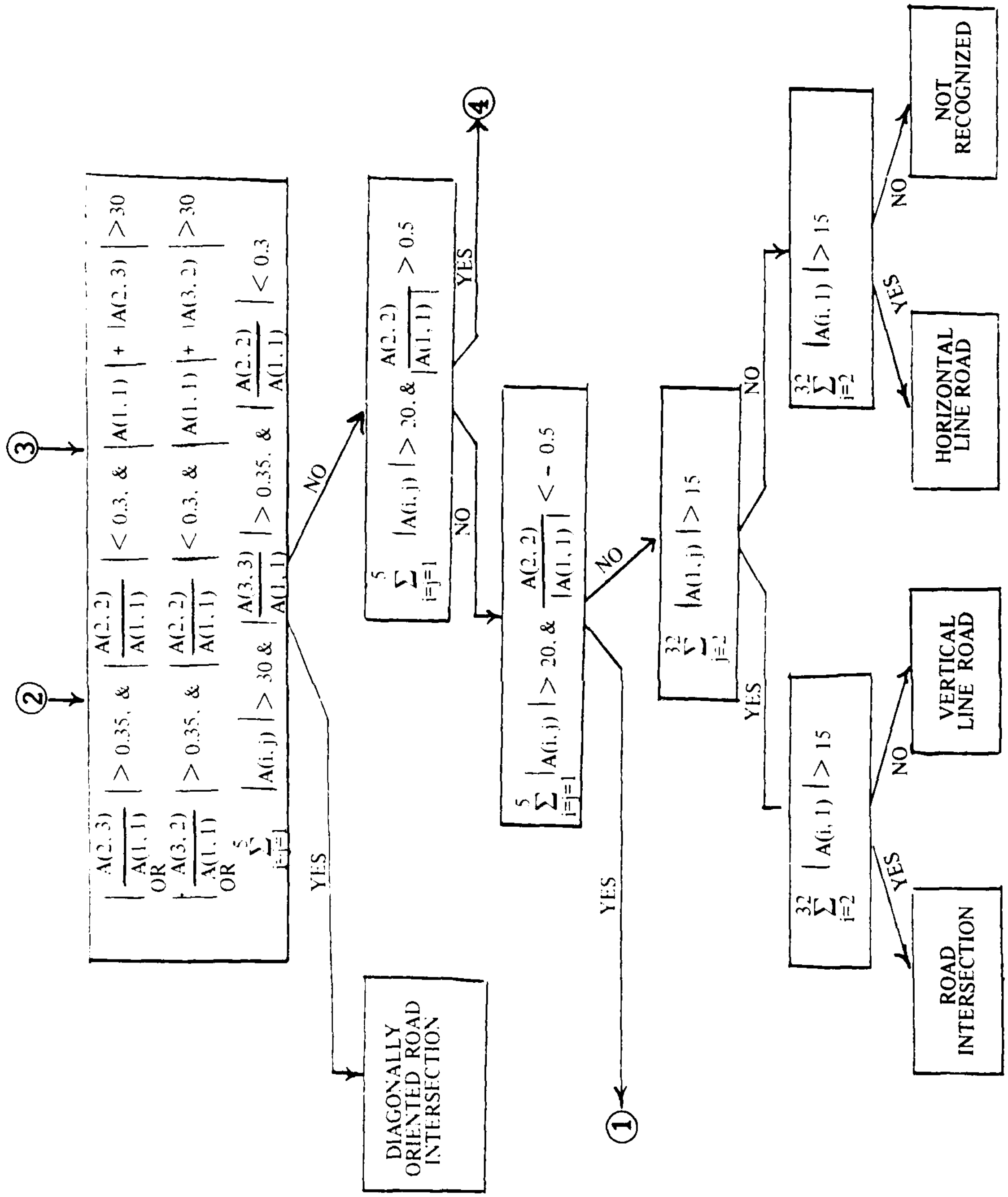

FIGURE 2. Continued.

Detection Results ● A selected set of images containing manmade cartographic features, such as road intersections, straight-line roads, and rectangular objects from aerial photo transparencies with a few mask patterns, were used as input test patterns for the system. The spatial signal signatures, the associated Walsh transforms, and the classification results are shown for each of the test images. In figures 3 through 6, the results are shown for a road intersection, a rectangular object, a horizontal-line road, and a vertical-line road, all at different positions in the window of inspection. They were detected and classified correctly, regardless of their location with respect to the window. In figure 7, the detection results are shown for a diagonally oriented road intersection. The correct classification was obtained for a majority of feature locations with respect to the window. However, the feature was misclassified when the center of the diagonally oriented road intersection was positioned against four corners of the window. The misclassification occurred because the energy contributed by a branch of the diagonally oriented road intersection is much stronger than that of the other branch. In figures 8 and 9, the results are shown of the classification for the diagonally oriented line road having 45 and 135 degrees angles with respect to the x-axis of the window. They are recognized correctly in a majority of locations. However, the roads were not recognized when they moved towards the four corners of the window. A very dark area projected on the array is shown in figure 10. For this case, no recognition was possible. A few other segments of the same aerial photo transparencies having relatively complicated scenes were also tried. Most of them were recognized correctly, although some were misclassified or not recognized. The results are shown in figures 11 through 13.

The overall results indicate that the Walsh transform processing technique is quite successful to detect well-defined, linear, manmade cartographic features. A rotational dimension may be incorporated in the future to refine the method for detecting the above cartographic features at various angles with respect to the axes of the window.

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INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	100	0	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	0	100	100	100	100	100	100	100	0	0
16	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
17	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
18	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	18	0	-8	-1	7	0	-7	0	5	0	-5	0	6	0	-6	0
2	0	0	-1	0	0	0	0	0	-1	0	0	1	0	0	0	0
3	-11	0	0	0	0	0	0	0	2	1	-1	-1	1	0	0	-1
4	-1	0	3	1	-1	0	2	0	0	0	0	0	0	0	1	0
5	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0
7	-10	0	0	0	0	0	0	0	1	0	-1	0	1	0	0	0
8	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
9	8	-1	1	0	-1	0	1	0	0	1	0	0	0	0	0	0
10	-3	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-8	2	-1	0	1	0	-1	0	0	0	0	0	0	0	0	0
12	2	1	0	0	0	0	0	0	0	-1	0	0	0	0	0	0
13	9	-1	1	0	-1	0	0	0	-1	0	0	0	0	0	0	0
14	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ROAD INTERSECTION

FIGURE 3. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Road Intersection.

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INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
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2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
9	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
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11	0	0	0	0	0	0	0	100	0	100	0	0	0	100	0	100	100	100	100	100	100	100	100	100	100	0	0	100	100	100	100	100
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0
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21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
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23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0

MAY 16 1979 8:50

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	18	-11	-7	7	-7	7	6	-6	3	-2	-2	2	-4	3	3	-3
2	8	-1	1	-1	1	-1	-2	2	0	0	1	-1	0	0	0	0
3	-4	-2	0	1	-1	1	0	0	0	0	1	-1	0	0	0	0
4	-4	-2	0	0	-1	1	0	0	0	0	1	-1	0	1	0	0
5	-10	3	0	0	0	0	1	0	1	-1	-2	2	0	0	1	-1
6	-10	3	0	0	0	0	1	-1	0	-1	-2	2	0	0	1	-1
7	4	2	0	-1	1	-1	0	0	0	0	0	0	0	-1	0	0
8	4	2	0	-1	1	-1	0	0	0	0	-1	1	0	-1	0	0
9	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-3	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	-3	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ROAD INTERSECTION

FIGURE 3. Continued.

MAY 16 1979 9:16

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	100	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0
13	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
30	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
31	100	100	100	100	0	100	100	100	100	100	100	100	100	100	100	100
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	[illegible]
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]
6	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	[illegible]
7	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0
22	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0
23	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0
24	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0
25	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	[illegible]
26	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	[illegible]
27	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	[illegible]
28	0	0	0	0	0	100	0	100	100	100	100	100	100	100	100	[illegible]
29	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	[illegible]
30	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	[illegible]
31	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	[illegible]
32	0	0	0	0	0	100	0	100	0	100	100	100	100	100	100	0

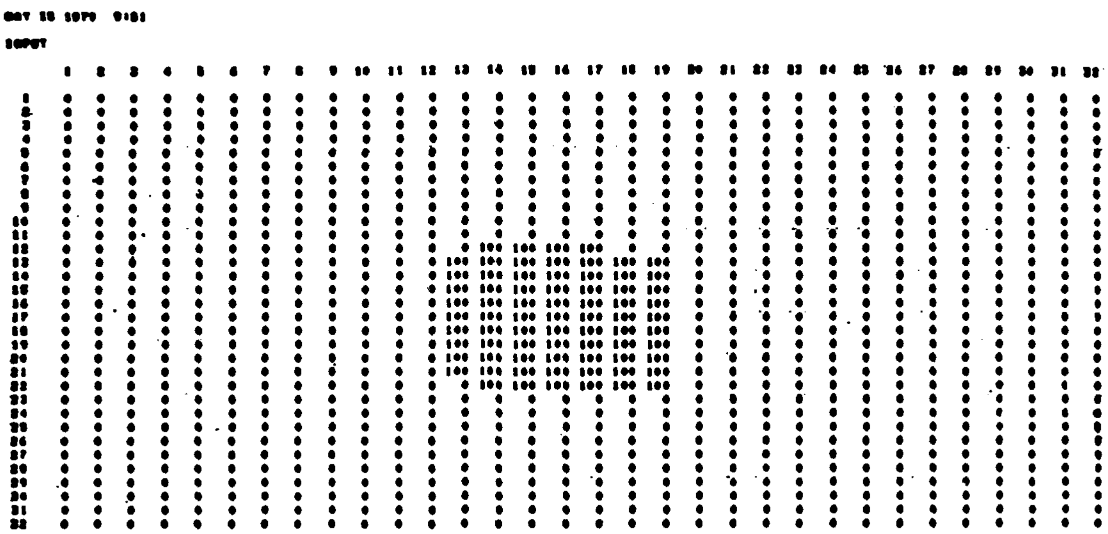
MAY 16 1979 9:17

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	19	-7	9	-6	6	-2	7	-3	1	1	0	2	1	1	1	1
2	-11	3	0	2	2	0	1	0	1	0	1	0	1	0	1	0
3	10	-2	0	-1	-2	1	-1	0	0	0	0	0	0	-1	0	-1
4	-11	2	-1	1	1	-2	0	-1	0	0	0	0	0	0	0	0
5	6	2	-3	2	0	0	0	0	0	0	0	0	0	0	0	0
6	-7	-3	1	-3	0	-1	0	-1	0	0	-1	0	0	0	0	0
7	6	1	-2	1	0	0	0	0	-1	0	-1	0	-1	0	-1	0
8	-7	-2	1	-1	0	0	0	0	0	0	0	0	0	0	0	0
9	-2	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
12	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
13	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0
15	-2	-2	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0
16	1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0

ROAD INTERSECTION

FIGURE 3. Continued.



MAY 15 1979 9:51

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	7	1	-7	-1	7	1	-7	-1	1	0	-1	0	1	0	-1	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	-7	-1	7	1	-7	-1	7	1	-1	0	1	0	-1	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	1	0
5	3	0	-3	0	3	0	-3	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	-3	0	3	0	-3	0	3	0	0	0	0	0	0	0	0	0
8	-0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	-1	0	1	0	-1	0	1	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	0	-1	0	1	0	-1	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	1	0	-1	0	1	0	-1	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	-1	0	1	0	-1	0	1	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RECTANGULAR OBJECT

FIGURE 4. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Rectangular Object.

MAY 15 1979 10: 4

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MAY 15 1979 10: 4

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	6	-6	-6	6	-1	1	1	-1	-1	1	1	-1	0	0	0	0
2	6	-6	-6	6	0	0	0	0	-1	1	1	-1	-1	1	1	-1
3	-4	4	4	-4	0	0	0	0	0	0	0	0	0	0	0	0
4	-4	4	4	-4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	-1	1	1	-1	0	0	0	0	0	0	0	0	0	0	0	0
7	-1	1	1	-1	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	-1	-1	1	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	-1	-1	1	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	-1	1	1	-1	0	0	0	0	0	0	0	0	0	0	0	0
15	-1	1	1	-1	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RECTANGULAR OBJECT

FIGURE 4. Continued.

MAY 15 1979 10:22

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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TRANSFORM.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0
2	-8	-8	-8	-8	0	0	0	0	0	0	0	0	0	0	0	0
3	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0
4	-4	-4	-4	-4	0	0	0	0	0	0	0	0	0	0	0	0
5	-2	-2	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0
6	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0
7	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0
8	-2	-2	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RECTANGULAR OBJECT

FIGURE 4. Continued.

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INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	[illegible]
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0	100	0	100	100	100	100	100	100	100	100	100	0
17	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	[illegible]
18	100	100	100	0	0	0	100	0	0	0	0	0	100	0	100	100	100	100	100	100	100	100	0	100	100	0	0	0	100	0	100	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	9	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3	-9	-1	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0
4	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0
5	8	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
6	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7	-8	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
8	0	-2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0
9	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	-1	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0
15	-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

HORIZONTAL LINE ROAD

FIGURE 5. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Horizontal-Line Road.

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INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
8	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0
9	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
11	100	100	100	0	100	0	100	100	0	0	0	0	100	100	100	100
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	100	100	0	0	0	0	0	100	100	100	100	100	100	100	0	0
10	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
11	100	100	100	100	100	100	100	100	100	0	0	0	100	0	100	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	9	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2	9	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
3	-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	-8	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
6	-8	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
7	6	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0	0
8	6	0	-1	0	0	0	-1	0	0	0	0	0	0	0	0	0
9	4	1	1	0	0	0	0	0	0	0	-1	0	0	0	0	0
10	4	1	1	0	0	0	0	0	0	0	-1	0	0	0	0	0
11	-1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
12	-1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
13	-5	-2	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0
14	-5	-2	-1	0	0	0	0	-1	0	0	0	0	0	0	0	0
15	2	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
16	2	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0

HORIZONTAL LINE ROAD

FIGURE 5. Continued.

MAY 15 1979 9:20

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	100	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0
27	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0
28	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
29	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
30	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
31	100	0	100	0	100	0	100	0	100	0	0	0	0	0	100	100
32	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	100	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0
29	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
30	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
31	100	100	100	100	100	100	100	0	100	0	0	0	100	100	100	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MAY 15 1979 9:20

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	10	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2	-10	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
3	10	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4	-10	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
5	5	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	-5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	5	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	-5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	-6	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	-6	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	-2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	-2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HORIZONTAL LINE ROAD

FIGURE 5. Continued.

MAY 15 1979 9:34

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MAY 15 1979 9:34

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	9	0	-8	1	9	0	-8	1	9	0	-8	1	9	0	-8	1
2	0	-3	0	2	0	-3	0	2	0	-3	0	2	0	-3	0	2
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VERTICAL LINE ROAD

FIGURE 6. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Vertical-Line Road.

MAY 15 1979 9:35

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0	0

MAY 15 1979 9:36

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	9	-9	-8	8	-9	9	8	-8	3	-3	-2	2	-3	3	2	-2
2	0	0	0	0	0	0	0	0	1	-1	0	0	-1	1	[illegible]	0
3	0	0	1	-1	0	0	-1	1	0	0	0	0	0	0	[illegible]	0
4	0	0	0	0	0	0	0	0	1	-1	0	0	-1	1	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0

VERTICAL LINE ROAD

FIGURE 6. Continued.

MAY 15 1979 9:32

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	100	100	100	100	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MAY 15 1979 9:33

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	11	11	11	11	7	7	7	7	-4	-4	-4	-4	-1	-1	-1	-1
2	0	0	0	0	-3	-3	-3	-3	-3	-3	-3	-3	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

VERTICAL LINE ROAD

FIGURE 6. Continued.

MAY 15 1979 10:31

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
2	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100
3	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100
4	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0
5	0	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0
6	0	0	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0
7	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0
8	0	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0
9	0	0	0	0	0	0	100	100	100	100	100	100	100	100	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0
10	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0
24	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0
25	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0
26	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0
27	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0
28	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100
29	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
30	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100
31	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100
32	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100

MAY 15 1979 10:31

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	37	2	-1	-1	-3	0	0	-1	-2	0	0	0	-2	0	0	0
2	5	0	-1	0	-1	0	0	0	0	0	0	0	0	0	0	0
3	0	2	27	1	0	-4	4	0	0	0	-8	0	0	0	2	0
4	0	0	2	0	-2	0	0	1	0	0	-1	1	0	0	0	0
5	-4	0	0	4	17	0	0	0	-2	0	0	-2	8	0	0	0
6	0	-1	3	-1	0	-1	0	0	0	1	-1	1	0	0	0	0
7	0	1	3	0	0	2	9	0	1	-2	2	0	0	0	2	0
8	1	0	1	0	2	0	-1	-1	0	2	0	0	0	0	0	0
9	-2	0	0	-1	-2	0	-1	2	3	0	0	1	-1	0	0	0
10	0	0	0	0	0	0	1	-3	-1	-1	1	0	0	0	0	0
11	0	0	-7	0	0	1	2	0	0	0	1	0	1	1	0	0
12	0	0	0	0	1	-2	0	0	0	-2	0	0	1	1	0	-1
13	-3	0	0	1	8	0	0	0	-1	0	-1	-1	1	0	0	0
14	0	0	1	0	1	0	0	0	0	0	-1	-1	0	1	0	0
15	0	0	2	0	0	0	2	0	0	0	0	0	0	0	-1	0
16	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	2

DIAGONALLY ORIENTED ROAD INTERSECTION

FIGURE 7. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Diagonally Oriented Road Intersection.

MAY 15 1979 10:36

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	100	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	100	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	100	100	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	100	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0

MAY 15 1979 10:36

TRANSFORM

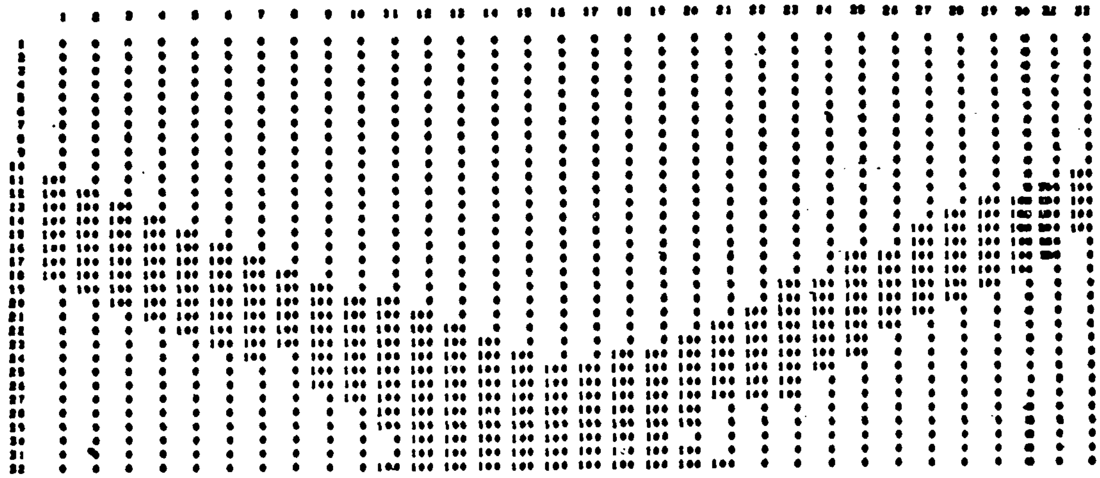
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	21	15	-3	1	1	-3	-2	2	1	0	0	1	0	-1	0	1
2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	-3	-6	-14	-8	8	3	-7	-2	-1	-2	0	0	2	0	-3	-1
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	-4	5	10	6	2	-3	0	0	0	-4	-3	2	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	-5	-5	0	0	-4	-2	1	3	3	0	0	0	0	-1	0
8	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
9	-1	-2	-2	0	-1	-1	2	2	-2	0	1	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	0	2	3	-3	-3	1	2	0	2	0	-1	-1	0	2	0
12	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0	0	0
13	0	-2	2	4	2	0	-1	0	0	0	0	-1	2	2	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1
15	0	-1	-1	0	0	0	0	0	0	1	0	0	0	0	-1	-1
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

DIAGONALLY ORIENTED ROAD INTERSECTION

FIGURE 7. Continued.

MAY 15 1979 10:40

INPUT



MAY 15 1979 10:40

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	25	2	-2	0	0	0	0	1	-1	-1	0	1	0	0	0	0
2	-16	-2	11	0	5	0	6	0	0	1	0	0	2	0	2	0
3	-6	0	-15	-1	6	-1	-5	0	0	0	1	0	2	0	-2	0
4	-1	0	6	1	-11	0	0	0	1	0	-1	0	-5	0	0	0
5	1	0	10	0	4	1	0	1	-1	0	-3	1	0	0	0	0
6	5	0	-4	0	-1	0	3	-1	0	0	0	0	0	0	0	0
7	-4	0	-7	0	-1	-1	-2	-1	1	-1	3	0	0	0	0	0
8	-1	0	1	0	-1	0	0	0	1	0	-1	0	0	0	0	0
9	0	0	-1	0	0	0	0	0	-2	1	0	0	0	0	0	0
10	0	0	1	0	-3	0	-1	0	0	-1	-2	0	0	0	0	0
11	0	0	0	0	-2	0	1	0	2	0	0	0	0	0	0	0
12	0	0	0	0	4	0	0	0	0	0	2	0	0	0	0	0
13	0	0	4	0	0	0	0	0	0	0	0	0	2	0	0	0
14	1	0	-2	0	0	0	0	0	0	0	0	0	0	0	1	0
15	-1	0	-3	0	0	0	0	0	0	0	0	0	-1	0	0	-1
16	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-1	1

DIAGONALLY ORIENTED ROAD INTERSECTION

FIGURE 7. Continued.

MAY 15 1979 10:41

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	100	100	100	100	100	100	0	0	0	100	100	100	100	100
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	100	100	100	100	100	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	100	100	100	100	100
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	100	100	100	100
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	100	100	100
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	100	100
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

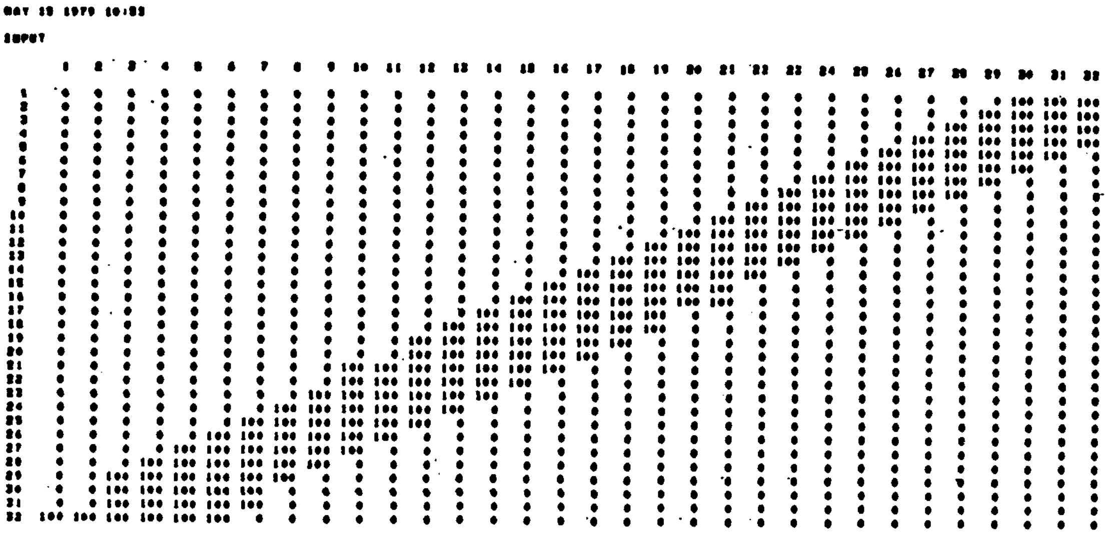
MAY 15 1979 10:41

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	25	-6	-1	0	0	0	0	-1	-2	1	0	-1	0	0	0	0
2	7	-23	-2	0	0	3	0	-2	-1	3	0	-1	0	2	0	-1
3	1	-3	10	5	-4	4	3	0	-1	0	-1	-1	-1	1	1	0
4	1	-3	-4	-7	-6	2	0	0	0	0	2	3	-1	0	0	0
5	0	0	-2	0	10	1	-1	0	0	-1	0	-1	3	1	0	0
6	0	2	0	0	0	-7	-1	0	2	0	0	-2	0	-2	0	-1
7	2	-4	3	0	0	-1	6	1	-1	1	1	0	-1	0	2	0
8	3	-4	0	0	0	-1	0	-4	-2	0	0	0	-1	0	0	-1
9	0	0	0	0	-1	0	-2	0	1	1	-1	1	-1	0	0	0
10	0	2	0	0	0	2	0	0	-2	-1	0	1	0	1	0	0
11	0	0	-2	-1	1	-2	2	0	0	0	1	0	1	-1	0	0
12	0	-1	1	3	2	-2	0	-1	0	0	0	-1	2	-1	-1	0
13	0	0	-1	1	4	0	0	0	0	-1	0	1	0	0	0	0
14	0	2	-1	0	0	-3	0	0	0	0	0	0	0	0	0	0
15	0	0	1	0	-1	0	1	0	0	0	0	0	0	0	0	-1
16	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	1

DIAGONALLY ORIENTED LINE ROAD, 45 DEGREES

FIGURE 7. Continued.



MAY 15 1979 10:56

TRANSFORM

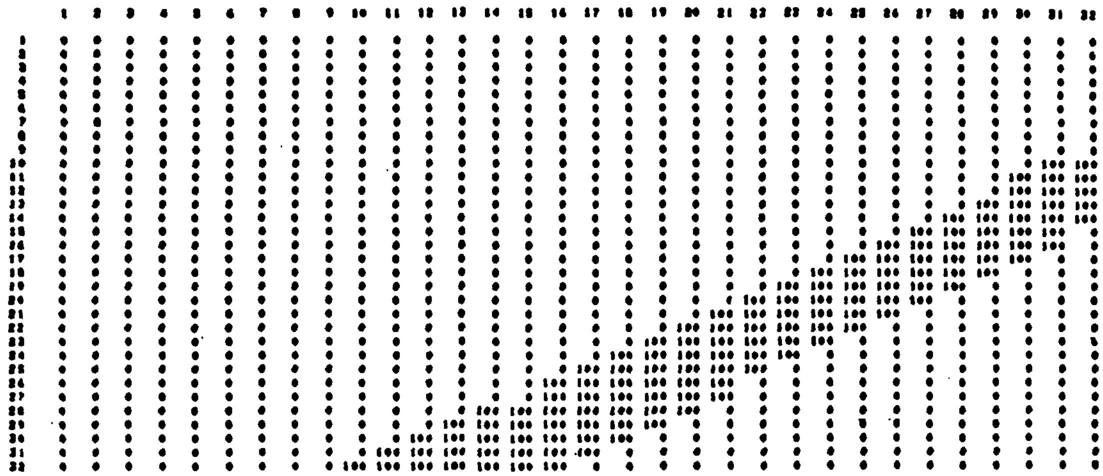
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	18	0	-2	0	-1	-1	-2	-1	0	0	0	0	0	0	-1	0
2	0	-16	2	0	0	3	2	0	0	2	0	0	0	2	0	0
3	-1	1	14	0	-3	-3	2	0	0	0	-3	0	-1	0	1	0
4	0	-1	0	-12	4	0	0	0	0	0	0	4	1	0	0	0
5	0	0	0	3	9	-1	-2	-1	-1	0	-1	-1	4	-1	-1	0
6	0	2	-2	-2	0	-7	2	0	0	2	2	0	0	-2	0	0
7	0	1	3	0	-1	0	5	-2	-1	-2	1	0	0	0	1	0
8	0	-1	0	0	0	-1	0	-3	2	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0
10	0	1	0	0	0	1	-1	-1	1	-2	0	0	0	0	0	0
11	0	0	-2	0	0	1	1	0	0	0	1	0	0	0	0	0
12	0	0	0	3	-1	0	0	0	0	0	0	-1	-1	0	1	0
13	0	0	0	1	3	0	-1	0	0	0	0	-1	0	1	0	0
14	0	1	-1	0	0	-2	0	0	0	0	0	0	0	0	-1	0
15	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	2
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0

DIAGONALLY ORIENTED LINE ROAD, 45 DEGREES

FIGURE 8. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Diagonally Oriented Line Road, 45 Degrees.

MAY 15 1979 11: 2

INPUT



MAY 15 1979 11: 2

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	12	-7	-3	-2	1	1	-1	-1	0	0	0	0	0	0	0	0
2	-7	1	8	-3	1	-4	4	-1	0	0	0	0	0	-1	2	0
3	-2	7	-7	2	4	-1	-4	1	0	0	0	0	2	0	-2	0
4	-3	-2	1	3	-7	4	1	1	0	0	0	0	-3	2	0	0
5	1	1	3	-7	0	1	-1	0	0	0	-2	3	0	0	0	0
6	0	-4	-1	4	0	-1	1	0	-1	2	0	-1	0	0	0	0
7	0	4	-4	1	0	0	1	-2	0	-2	2	0	0	0	0	0
8	-1	-1	2	1	0	0	-1	2	1	0	0	-1	0	0	0	0
9	0	0	0	0	0	0	0	1	-2	1	0	0	0	0	0	0
10	0	0	0	0	-1	2	-1	0	1	0	0	0	0	0	0	0
11	0	0	0	0	-1	0	2	-1	0	-1	1	0	0	0	0	0
12	0	0	0	0	3	-2	0	0	0	0	0	0	0	0	0	0
13	0	0	1	-3	0	0	0	0	0	0	0	0	0	0	0	0
14	0	-1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
15	0	1	-2	0	0	0	0	0	0	0	0	0	0	0	0	-1
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

DIAGONALLY ORIENTED LINE ROAD, 45 DEGREES

FIGURE 8. Continued.

MAY 15 1979 10:59

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MAY 15 1979 10:59

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	12	8	-2	2	1	-1	-1	1	0	0	0	0	1	0	0	1
2	7	2	-8	-3	-1	-4	-5	-2	0	0	0	0	0	-2	-2	0
3	-2	-7	-7	-2	4	1	-4	-1	0	0	0	0	2	0	-2	0
4	2	-1	-2	2	7	4	-1	1	0	0	0	0	3	1	-1	0
5	1	-1	4	7	0	-1	0	0	0	0	-2	-3	0	0	0	0
6	-1	-4	1	4	0	-1	-1	0	1	2	0	-2	0	0	0	0
7	-1	-4	-3	0	0	0	0	2	0	2	2	1	0	0	0	0
8	1	-1	-1	1	0	0	0	2	-1	0	0	-1	0	0	0	0
9	0	0	0	0	0	0	0	0	-2	-1	0	0	0	0	0	0
10	0	0	0	0	1	1	1	0	-1	0	0	0	0	0	0	0
11	0	0	0	0	-1	-1	2	1	0	1	1	0	0	0	0	0
12	0	0	0	0	-3	-3	0	0	0	0	0	0	0	0	0	0
13	0	0	2	3	0	0	0	0	0	0	0	0	0	-1	-1	0
14	0	-1	0	1	0	0	0	0	0	0	0	0	0	0	0	1
15	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0	0	1
16	0	0	0	0	0	0	0	0	0	0	0	0	0			

DIAGONALLY ORIENTED LINE ROAD, 45 DEGREES

MAY 15 1979 11: 3

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0

MAY 15 1979 11: 3

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	5	-5	4	-4	0	0	0	0	0	0	0	0	0	0	0	0
2	-5	5	-4	4	0	0	0	0	0	0	0	0	0	0	0	0
3	3	-3	2	-2	-2	2	0	0	0	0	-1	1	-1	1	0	0
4	-3	3	-2	2	2	-2	0	0	0	0	1	-1	1	-1	0	0
5	0	0	-2	2	-3	3	-1	1	0	0	0	0	-1	1	0	0
6	0	0	2	-2	3	-3	1	-1	0	0	0	0	1	-1	0	0
7	1	-1	0	0	-1	1	0	0	1	-1	0	0	0	0	0	0
8	-1	1	0	0	1	-1	0	0	-1	1	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	1	-1	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOT RECOGNIZED

FIGURE 8. Continued.

MAY 15 1979 10:47

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	100	100	100	100	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100

MAY 15 1979 10:47

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	1	13	-1	2	0	-1	0	0	0	-1	0	0	0	-1	0	0
3	-1	0	12	0	0	-1	2	0	-1	0	-1	0	0	0	1	0
4	0	0	1	10	-2	2	0	1	0	0	0	-2	-1	1	1	0
5	-1	0	-3	3	9	0	0	0	0	0	1	-1	3	0	0	0
6	1	-2	2	-1	1	8	0	1	0	0	-1	2	1	2	0	1
7.	-1	1	1	0	-2	2	6	0	1	-1	1	0	0	0	1	0
8	0	0	0	0	1	0	1	5	-2	2	0	0	0	0	0	0
9	0	0	0	0	-1	0	-3	3	3	1	0	0	0	0	0	0
10	0	-1	0	1	0	-2	2	-1	1	2	0	0	0	-1	0	0
11	-1	1	-3	0	-1	1	1	0	0	0	2	0	0	0	0	0
12	0	0	0	-4	1	0	0	0	0	0	0	1	0	0	0	0
13	0	0	-1	1	3	0	0	0	0	-1	0	0	1	0	0	0
14	0	-2	0	0	0	2	0	1	-1	0	0	0	0	0	0	0
15	0	0	1	0	-1	0	1	0	0	0	1	0	0	0	0	-1
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0

DIAGONALLY ORIENTED LINE ROAD, 135 DEGREES

FIGURE 9. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Diagonally Oriented Line-Road, 135 Degrees.

MAY 15 1979 10:53

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0

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TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	10	5	-1	3	1	-1	-1	0	0	0	0	0	0	0	0	0
2	-7	-2	4	0	1	3	4	1	0	0	0	0	0	1	1	0
3	-1	-6	-6	-2	4	1	-3	-1	0	0	0	0	1	0	-1	0
4	-1	3	3	-1	-6	-4	1	-1	0	0	0	0	-3	-2	0	0
5	2	-1	3	6	1	0	0	1	0	0	-1	-2	0	0	0	0
6	0	4	0	-4	0	1	1	0	0	0	1	2	0	0	0	0
7	-1	-4	-4	0	-1	-2	0	1	0	1	1	0	0	0	0	0
8	-1	2	1	-1	0	0	-2	-3	0	-1	-1	0	0	0	0	0
9	0	0	0	0	0	1	1	0	-3	-2	0	0	0	0	0	0
10	0	0	0	0	0	-1	-1	0	1	0	-2	-1	0	0	0	0
11	0	0	0	0	-2	-1	1	0	0	1	1	0	0	0	0	0
12	0	0	0	0	2	1	-1	0	0	0	0	0	0	0	0	0
13	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0
14	0	1	0	-1	0	0	0	0	0	0	0	0	0	0	0	0
15	0	-2	-1	0	0	0	0	0	0	0	0	0	0	0	0	1
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1

DIAGONALLY ORIENTED LINE ROAD, 135 DEGREES

FIGURE 9. Continued.

MAY 15 1979 10:50

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	100	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	8	-5	-2	0	1	0	0	-1	0	0	0	0	0	0	0	0
2	6	-4	-4	1	0	2	-2	0	0	1	-1	0	0	0	-1	0
3	0	3	-6	3	2	0	-3	1	0	0	0	-1	1	0	-1	0
4	1	1	-4	1	4	-2	-1	0	0	0	1	-1	1	0	0	0
5	0	1	3	-6	4	-1	0	-1	0	0	-1	1	1	0	0	0
6	-1	3	1	-4	2	0	-2	0	0	0	-2	1	0	0	-1	0
7	-1	4	-3	0	-1	3	-2	0	1	-1	-1	0	0	0	0	0
8	0	2	-1	-1	0	1	0	-2	2	-2	0	0	0	0	0	0
9	0	0	0	0	0	0	3	-3	-1	0	1	0	0	0	0	0
10	0	1	-1	1	0	0	2	-2	0	0	1	0	0	0	1	0
11	0	0	0	-1	-2	2	-1	1	0	0	0	0	-1	0	1	0
12	0	0	1	-2	-1	1	0	0	0	0	0	0	-1	1	0	0
13	0	0	1	-2	1	-1	0	0	0	0	0	0	0	0	0	0
14	0	1	0	-1	0	0	-1	0	0	0	0	0	0	0	0	0
15	0	1	-1	0	0	1	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	1

DIAGONALLY ORIENTED LINE ROAD, 135 DEGREES

FIGURE 9. Continued.

MAY 15 1979 10:54

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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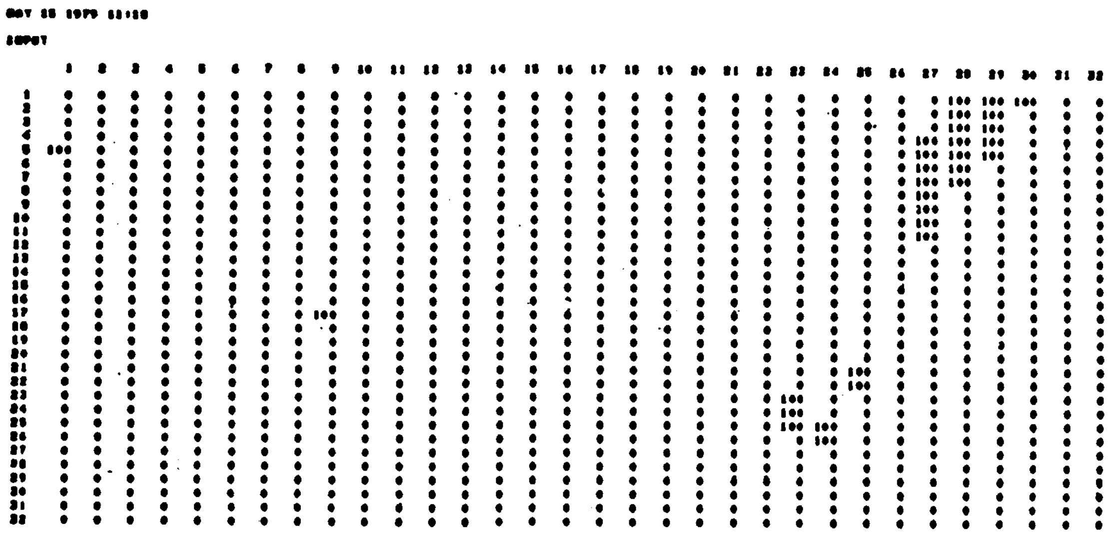
TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	3	3	2	2	0	0	1	1	0	0	0	0	0	0	0	0
2	-3	-3	-2	-2	0	0	-1	-1	0	0	0	0	0	0	0	0
3	3	3	2	2	0	0	0	0	0	0	-1	-1	0	0	0	0
4	-3	-3	-2	-2	0	0	0	0	0	0	1	1	0	0	0	0
5	0	0	-1	-1	-2	-2	-1	-1	0	0	0	0	-1	-1	0	0
6	0	0	1	1	2	2	1	1	0	0	0	0	1	1	0	0
7	0	0	0	0	-2	-2	-1	-1	0	0	0	0	0	0	0	0
8	0	0	0	0	2	2	1	1	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0
10	0	0	0	0	0	0	0	0	-1	-1	-1	-1	0	0	0	0
11	0	0	-1	-1	0	0	0	0	1	1	0	0	0	0	0	0
12	0	0	1	1	0	0	0	0	-1	-1	0	0	0	0	0	0
13	0	0	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOT RECOGNIZED

FIGURE 9. Continued.



MAY 15 1979 11:18

TRANSFORM

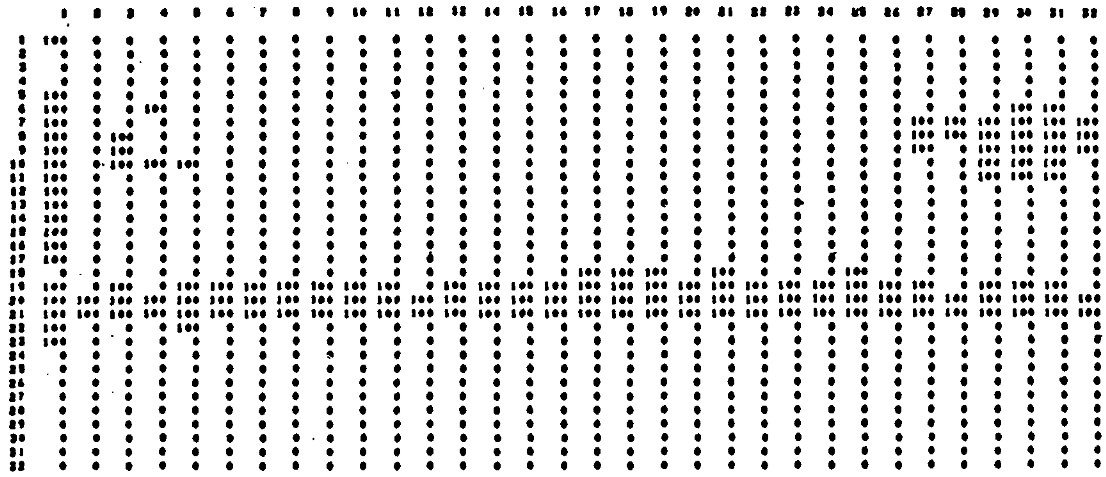
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2	-2	1	-1	-1	1	0	0	-1	1	-2	2	0	0	1	0
2	1	-1	2	-2	0	0	-1	1	-2	2	-1	1	1	-1	0	0
3	1	-1	1	0	0	0	0	0	-1	1	-1	1	0	0	0	0
4	1	-1	1	-1	0	0	0	0	-1	1	-1	1	0	0	0	0
5	0	0	0	0	1	-1	0	0	0	0	0	0	0	0	-1	1
6	0	0	0	0	0	0	0	-1	0	0	0	0	-1	1	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NOT RECOGNIZED

FIGURE 10. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Very Dark Area With Little Features.

MAY 15 1979 11:16

INPUT



MAY 15 1979 11:16

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	14	0	4	0	3	0	2	0	0	1	0	1	1	0	1	1
2	-5	0	4	-1	2	0	3	0	0	1	0	1	0	0	1	0
3	-9	0	0	-1	0	0	0	0	0	0	0	0	0	-1	0	-1
4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	-4	1	-2	0	-2	0	1	0	0	0	0	0	0	0
6	-6	2	-2	1	-2	0	-1	0	0	0	0	0	0	0	0	0
7	-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	2	0	-1	0	0	0	0	0	0	0	0	0	-1	0	-1	0
9	-6	-1	1	0	1	0	0	0	0	0	0	0	0	0	0	0
10	10	0	1	-1	0	0	0	0	0	0	-1	0	0	0	0	0
11	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	-8	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	-3	0	-1	1	0	0	0	0	0	0	1	0	0	0	0	0
14	0	1	-1	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	-1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

HORIZONTAL LINE ROAD

FIGURE 11. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Horizontal-Line Road With Noisy Background.

MAY 15 1979 11: 8

INPUT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	100	100	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0
2	100	100	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	100	100	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	100	100	0	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	100	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0
7	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	100	0	0	0
8	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	100	0	0	0	0	0
10	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	0	100	0	0	0
11	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	100	0
12	100	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100
13	100	100	0	100	100	100	100	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	100	100	100	100	100	0	100	100	100	0
14	100	100	0	100	100	100	100	0	100	100	0	0	100	0	100	100	100	100	100	100	100	100	100	100	100	0	100	0	0	0	0	0
15	100	100	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0	100	0	0	0
16	100	100	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	0
17	100	100	100	100	100	100	100	0	100	100	0	0	100	0	100	0	0	0	100	100	100	100	100	100	100	100	0	0	0	0	0	0
18	100	100	100	100	100	100	100	0	100	100	100	0	100	0	0	0	100	0	0	0	100	100	100	100	100	100	0	0	0	0	0	0
19	100	100	100	100	100	100	100	0	100	100	100	0	100	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0
20	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	0	0	0	0	0	0	0
21	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	0	0	0	0	0	0	0
22	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0
23	100	100	100	100	100	100	100	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	100	100	100	100	100	100	100	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	100	0	100	0
26	100	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	100	0
27	100	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	100	0
28	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	100	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	100	0	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0
32	100	100	100	100	100	100	100	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0

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TRANSFORM

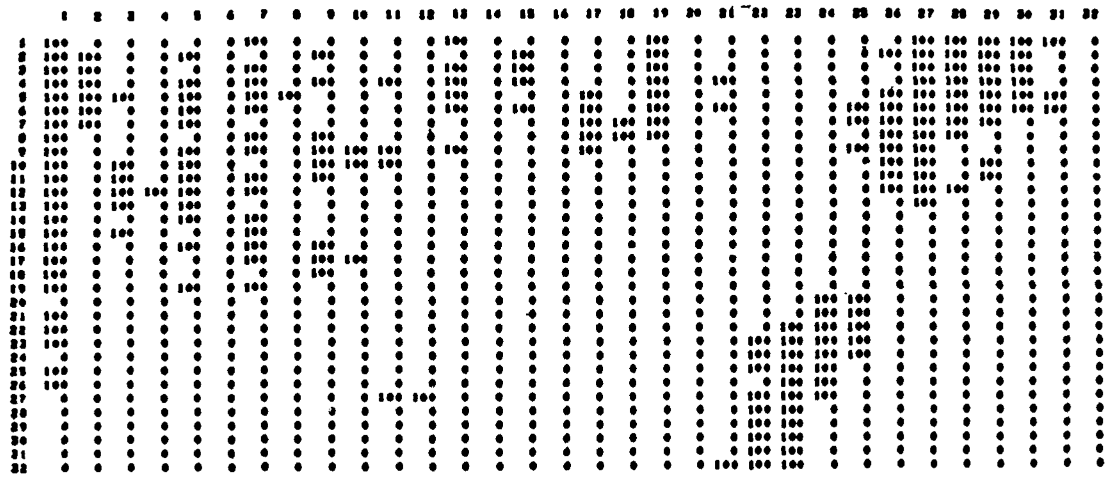
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	34	14	17	17	-2	4	1	2	-1	-2	-2	-3	0	3	3	4
2	3	-2	1	-2	0	0	-3	0	0	1	0	3	1	1	0	0
3	-11	3	4	1	4	-3	0	-1	-3	1	0	0	2	-1	0	-2
4	-4	3	0	2	0	0	2	0	0	0	0	0	0	0	0	1
5	6	0	-8	0	-2	0	0	-1	1	0	0	0	0	1	0	2
6	0	0	-3	0	2	-2	-1	-1	1	0	0	0	0	1	0	0
7	-8	1	7	-1	1	0	0	1	-1	0	-1	0	1	0	0	0
8	0	-2	2	0	0	0	1	-1	0	0	1	-1	0	0	0	0
9	2	1	-2	0	0	-1	0	1	0	1	0	0	0	0	0	0
10	0	1	-1	0	0	0	0	0	0	0	1	0	0	0	-1	0
11	0	-3	3	0	0	0	0	0	0	0	-1	0	0	0	0	0
12	0	-1	1	0	0	0	0	0	0	0	-1	0	0	0	0	0
13	3	0	0	-1	-1	0	0	0	0	0	0	0	0	0	0	0
14	1	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0
15	-3	0	1	0	0	0	0	0	0	0	-1	0	0	0	0	0
16	-1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0

ROAD INTERSECTION

FIGURE 12. Spatial Signal Signatures, Walsh Transforms, and Classification Results for a Road Intersection With Noisy Background.

MAY 15 1979 11:19

INPUT



MAY 15 1979 11:20

TRANSFORM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	19	-1	4	2	-3	3	1	2	1	4	0	4	0	2	3	2
2	9	2	8	-3	3	-2	-5	4	-2	4	-1	1	1	-1	0	2
3	4	-4	-1	0	2	0	0	-1	-2	3	0	2	1	0	0	0
4	4	-2	2	-2	3	0	-3	1	0	3	0	2	0	1	1	1
5	-3	2	0	0	1	-1	0	-2	-1	3	0	0	0	-1	0	0
6	-1	0	-1	0	0	1	2	-2	0	0	0	1	0	2	1	-2
7	1	-1	0	-2	-1	1	1	0	-1	0	0	0	-1	0	0	0
8	1	2	0	-2	0	-1	1	0	-1	2	-1	0	0	0	1	0
9	0	0	-2	0	0	0	0	1	2	0	0	0	0	0	0	1
10	-1	0	-1	-1	0	-1	0	1	0	-1	0	0	0	0	0	0
11	-2	-1	1	1	0	1	-1	0	0	-1	-1	0	0	0	0	0
12	-1	-1	0	0	0	0	0	1	0	0	-1	0	0	0	0	0
13	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	-1	2	1	0	1	0	-2	0	0	0	0	-1	0	0	-1
15	1	-1	0	-1	0	0	0	-1	-1	-1	0	0	0	0	0	0
16	0	0	1	-1	1	0	0	0	0	0	0	0	0	0	1	1

ROAD INTERSECTION

FIGURE 13. Spatial Signal Signatures, Walsh Transforms, and Classification Results for Small Streets With Noisy Background.

CONCLUSIONS

1. The signal signature of the spectrally decomposed cartographic features is much simpler in distribution than the spatial signal signature of the same cartographic feature for all selected cases.

2. In most cases, the significant spectral components are distributed among few, lower order Walsh transform coefficients. Further, each transform pattern is unique in itself, and it can be easily distinguished from the rest.

3. Two or more reference signal signatures were required for each class of the selected set of cartographic features since they may appear in a variety of locations with respect to the window of inspection.

4. Four classes out of seven of the cartographic features selected were detected and recognized without error, regardless of their locations with respect to the window. The rest of the feature classes were also classified correctly in a majority of locations. However, misclassifications occurred when these features were positioned very close to the corners of the window. Nearly 90 percent recognition accuracy was obtained for the selected set of the cartographic features.

5. A rotational means may be incorporated in the feature to refine the scheme to detect the cartographic features in a variety of angles with respect to the axes of the window.

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